



TITLE:

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RECORDS OF TWO LANCELET SPECIES, *ASYMMETRON*
MALDIVENSE AND *A. LUCAYANUM*, FROM
THE WESTERN NORTH PACIFIC¹⁾

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With Text-figures 1-2 and Tables 1-2

Recently I had a chance to examine five specimens of lancelets collected in the western North Pacific.

A single lancelet was found by Dr. Masatsune Takeda, National Science Museum, Tokyo, in the benthos samples dredged under the research programme of "Natural History of the Pacific Ocean Side of Southwest Japan" (a part of the Natural History Research Project of the Japanese Islands by National Science Museum), at a depth of about 50 m around Tanegasima Island near the south end of Kyusyu Island, Japan. This specimen is identifiable, though tentatively, with *Asymmetron maldivense* (Forster-Cooper, 1903) in spite of a striking deformation seen in one of the important features defining the genus. Evidently this is the second species of lancelets found in the Japanese waters and at the same time gives a new locality for the species. One of the other specimens is a finely preserved one identified exactly with *Asymmetron lucayanum* Andrews, 1893, that was collected from the Palao Islands in the Western Caroline Islands and included in the collection of Dr. Tokioka. The rest three are the specimens of the same species, that were collected by Mr. Shigeo Nakamura, Sesoko Marine Science Laboratory, University of the Ryukyus, and Dr. Hiroshi Morino, Ibaragi University, near Sesoko Island of Okinawa.

Before going into the description, I would like to express my cordial thanks to Dr. Takeda, Mr. Nakamura, Dr. Morino and Dr. Tokioka for the precious specimens and again to Dr. Tokioka for his critical reading of the manuscript.

Asymmetron maldivense (Forster-Cooper, 1903)

(Fig. 1)

Asymmetron maldivense—Franz, 1922a, pp. 424-5; Massé, 1964, pp. 271-2.

Asymmetron (*Heteropleuron*) *maldivense*—Herdman, 1904, p. 137.

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Heteropleuron maldivense—Forster-Cooper, 1903, pp. 349–352, pl. XVIII, fig. 2, text-figs. 77–81; Parker, 1904, pp. 42–43, tab. 1.

Epigonichthys maldivensis—Hubbs, 1922, p. 15; Eldredge, 1967, p. 564.

Material: A single specimen dredged at Station 21 of the research programme mentioned above, coarse sandy bottom about 50 m deep and about 5 km off the east coast of Tanegasima Island, southern Japan, June 18, 1975.

Description: The single specimen preserved in alcohol is 27.0 mm long and 3.8 mm high in the tallest region; the meristic characters are given in Table 1. The dorsal fin is tallest near the anterior end, where the ratio of the height of fin-ray chambers to their breadth is about 10; the fin decreases the height in the posterior region, where the same ratio is 3 to 4. Buccal cirri are 10 on each side, without any distinct lateral papillae on each surface and connected one another by a thin transparent membrane (intertentacular membrane) that is prominent toward the ventral mid-line and diminishing the height gradually toward the anterolateral ends (Fig. 1, a). The anterior end of the left oral hood is connected to the left side of the infra-rostral fin, while that of the right oral hood is continuous to the mid-ventral ridge of the same fin. Posterior to the row of regular cirri surrounding the mouth, there is a tuft of 6 short cirrus-like filaments, tightly connecting one another by a thin membrane. Twenty-one gonads, containing many eggs, are situated only on the right side of the body. The mid-gut coecum is very short, extending the span of 5 to 6 myotomes (Fig. 1, b). Right and left metapleura are confluent together with the ventral fin behind the atriopore, as observed in the species of *Branchiostoma* (Ibid.). “Urostyle process” (Kirkaldy, 1895), that is seen at the posterior end in *Asymmetron lucayanum* Andrews, 1893 is absent.

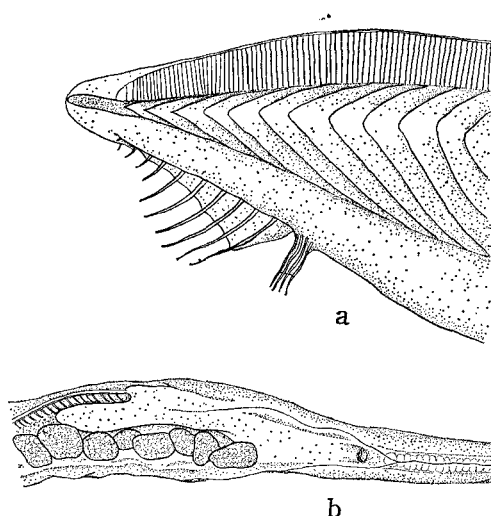


Fig. 1. *Asymmetron maldivense* (Forster-Cooper, 1903) from Tanegasima Island, Japan. a: left side of the anterior end of body. b: ventral side around the posterior one-third, showing short mid-gut coecum, gonad, atriopore and metapleura.

Table 1. Meristic characters of the specimens from different localities in *Asymmetron maldivense*.
a, number of dorsal fin-ray chambers; b, number of preanal fin-ray chambers; c, relative length of postatrial region to preatrial region; d, number of myotomes from the anterior end to atriopore; e, number of myotomes from atriopore to anus; f, number of myotomes posterior to anus; g, total number of myotomes; h, total length (mm); i, total number of buccal cirri; j, number of gonads; k, number of specimens examined; l, author.

Locality (depth)	a	b	c	d	e	f	g	h	i	j	k	l
Tanegasima Island (ca. 50 m)	350	38	0.42	41	14	13	68	27.0	20 ₊₆	21	1	present paper
Maldiv Islands (15-20 fms)				45-46	16	12-13	73-76	20 (max.)	23		4	Forster-Cooper 1903
Zanzibar (7-8 fms)				42-46 (44.62)	15-17 (15.93)	11-14 (12.2)	70-76 (72.75)	18-30		23-30 (26.0)	45	Punnett 1903
Maldiv Islands (16 fms)				42-43	16	11-12	70-71	16-19		23-24	3	Parker 1904
Madagascar (dredged)	285	40		42	15	12	69	12-30	26		?	Massé 1964
Oahu, Hawaii islands (16-20 fms)				43	15	15	73	23		18	1	Eldredge 1967

Remarks: Two species of *Asymmetron* (sensu Franz, 1922a, b) have been recorded so far, from the western North Pacific, namely *A. lucayanum* Andrews, 1893 from the Philippines (Franz, 1922a) and *A. cultellum* (Peters, 1896) from the southern coast of China to Gulf of Tonkin (Tchang-Si, 1962). The present specimen is, however, distinguishable distinctly from these two as easily judged from the meristic characters shown in Table 1. It is related most closely to *A. maldivense* so far recorded from Zanzibar, Madagascar, the Maldiv Islands and the Hawaiian Islands, especially in the shape of the dorsal fin, the intertentacular membrane well developed and the meristic characters (Table 1), if the feature of the metapleura and the existence of a tuft of additional cirrus-like filaments can be put aside. Franz (1922a, p. 417, fig. 25) has already referred to the occurrence of a tuft of small tentacles of different sizes inside the preoral cavity in a specimen of *A. bassanum* (Günther, 1884). Very probably, the tuft of additional cirrus-like filaments in the present specimen may be regarded as an abnormal structure possibly formed in the course of wound recovery. Then, the problem remains in the morphology of the metapleura. The definition of the genus *Asymmetron* Andrews, 1893 emend. or the family Epigonichthidae Hubbs, 1922 including *Asymmetron* comprises the asymmetrical arrangement of the gonads and the asymmetrical structure of the metapleura. The gonads are found only on the right side and of the metapleura, the right one is continuous with the ventral fin, while the left is terminated behind the atriopore (Bigelow and Farfante, 1948, p. 7). The present Japanese specimen is very peculiar in that it is provided with the series of gonads solely on the right side, while both metapleura are terminating close behind the atriopore. The last feature is evidently a criterion defining the genus *Branchiostoma* Costa, 1834 or the family Branchiostomidae

Bonaparte, 1846 including *Branchiostoma*. Therefore, the present specimen shows an intermediate appearance between the two genera, *Branchiostoma* and *Asymmetron* or the two families Branchiostomidae and Epigonichthidae.

If the present specimen represents a normal individual of a certain form, this form can safely be enough to establish a new genus or at least a new species. However, there remains possibility that the present specimen is a product of unusual deformation. It might be a deformed individual of *Branchiostoma* (sensu Franz, 1922a, b), with the gonads missing completely on the left side, or an individual of *Asymmetron*, with an important deformation of the metapleura near the atriopore. Really, there have been recorded many examples of the asymmetrical arrangement of the gonads in the species of *Branchiostoma* (for example, see Franz, 1922a, pp. 381–384), but the complete lack of the left gonads is so far unknown in this genus. It seems to me that the deformation of the metapleura near the atriopore is more possible than the complete disappearance of the gonads on the left side. Thus, the present specimen is recorded here tentatively as a deformed individual of *A. maldivense*.

In the number of myotomes, the present specimen is situated near *A. parvum* (Parker, 1904) and *A. agassizii* (Parker, 1904) from the Maldiv Islands. However, Franz (1922a, b) suggested already that these two species might be conspecific with *A. maldivense*. Further, it seems somewhat difficult to define the species mainly on slight differences in the number of myotomes. The treatment of these two species may better be left for future studies.

This specimen is deposited at the National Science Museum, Tokyo (NSMT-Ce. 1001).

Asymmetron lucayanum Andrews, 1893

(Fig. 2)

Asymmetron lucayanum—Franz, 1922a, pp. 426–432, text-figs. 30–32 (synonyms); Bigelow and Farfante, 1948, pp. 19–23, figs. 3A–E (synonyms); Steinitz, 1962, pp. 35–38; Massé, 1964, pp. 270 and 272; Gibbs and Wickstead, 1969, pp. 135–8, fig. 2, tabs. 2–3; Duarte-Bello and Buesa, 1973, p. 8.

Material: A single ovigerous specimen collected by Mr. Renzi Wada on July 6, 1940 from the sandy floor around Koror Island, Palao, in the Western Caroline Islands. Three immature specimens from about 900 m east off Tôdumai on the southeastern coast of Sesoko Island situated northwest of Okinawazima Island, collected by Mr. Nakamura and Dr. Morino on November 1, 1978, about 15 m deep, dredged with 25 cm × 25 cm × 5 cm sampler, a single trial.

Description: The meristic characters of a single formalin-preserved specimen from the Palao Islands and the three alcohol-preserved specimens from Okinawazima Island (Nos. 1–3) are shown in Table 2.

Rostral fin is more or less marked off from dorsal fin (Fig. 2, a–d). Intertentacular membrane is especially higher in the span of 4 to 5 cirri on each side next to the shorter midventral cirrus (span of 4 cirri in two of three specimens from Okinawa, span of 5

Table 2. Meristic characters of the specimens of *Asymmetron lucayanum* from the Palao Islands and Okinawazima Island. Asterisk shows the approximate number in somewhat deteriorated specimens. For symbols, see the explanation of Table 1.

Locality (depth)		a	b	c	d	e	f	g	h	i	j
Koror, Palao Islands (unknown)		170	0	0.48	41	9	11	61	23.4	30	28
Sesoko Island, Okinawa (ca. 15 m)	No. 1	140*	0	0.39	42	9	12	63	17.4	29	0
	No. 2	170*	0	0.39	44	10	12	66	13.6	22	0
	No. 3	100*	0	0.39	44	cannot be counted			12.3	21	0

cirri in one of the Okinawa specimens and in the Palao specimen) (see Fig. 2, e-f), as illustrated in the original description (Andrews, 1893, pl. 13, fig. 6.; for its variation, see Bigelow and Farfante, 1948, p. 21, footnote) Mid-gut coecum is long and extending to the span of about 12 myotomes in the Palao specimen; the coecum is indiscernible in the Okinawa specimens that are rather heavily deteriorated. Even in immature specimens from Okinawa only the left metapleuron is terminated behind the atriopore. Urostyleoid process is about 1.2 mm long in No. 1 specimen (17.4 mm long), about 1.4 mm in No. 2 (13.6 mm long) and about 2.5 mm in the Palao specimen (23.4 mm long). The caudal fin in the Palao specimen is smooth as seen in Fig. 2 (for its morphological variation, see Bigelow and Farfante, 1948, p. 19, footnote).

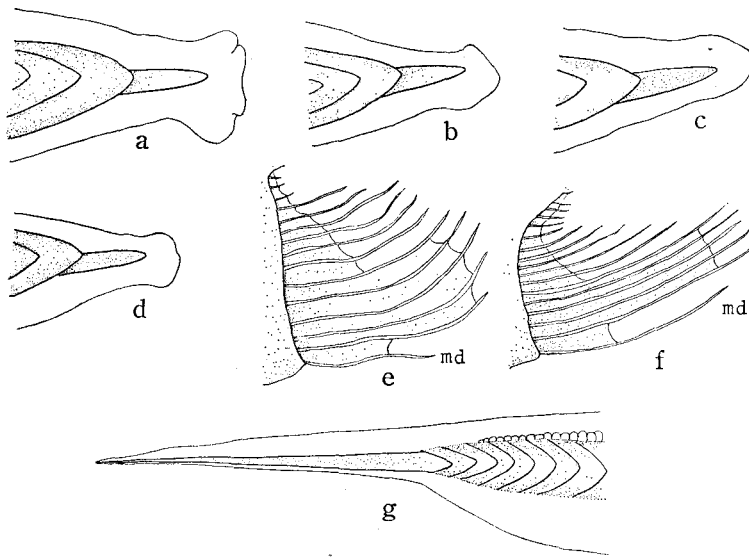


Fig. 2. *Asymmetron lucayanum* Andrews, 1893 from Okinawazima Island (a, b, c, e) and the Palao Islands (d, f, g). a-d: anterior end of body. e-f: buccal cirri on the right side. g: posterior end of body. md--shorter midventral cirrus.

Remarks: The features of these specimens, especially of the perfect Palao specimen, conform well with those in the previous descriptions of the species. These two records respectively from Okinawazima Island and the Palao Islands evidently add new localities to this species. The Okinawa specimens are deposited at Sesoko Marine Science Laboratory, University of the Ryukyus, while the Palao specimen at Seto Marine Biological Laboratory (No. Rare-293).

As widely known by the word of amphioxus-sand, the size of sand grains might be very significant to show the conditions of the habitats of lancelets. The locality of the Okinawa specimens is noted by strong current and the field data obtained there are recorded here as follows: surface temperature 26°C, bottom temperature 23.4°C (ca. 15 m deep). A rough example of particle size distribution is more than 2 mm (4.1%), 2 to 1 mm (14.5%), 1 to 0.5 mm (28.5%), 0.5 to 0.25 mm (33.6%), 0.25 to 0.125 mm (17.0%) and 0.125 to 0.063 mm (2.3%) (Morino, unpublished).

P.S.: After the manuscript was sent to the editorial board of the journal, another ovigerous lancelet was dredged at a depth of about 16 m by Mr. Manabi Manabe near a rocky islet, "Ooguso", about 50 m west off the Cape Banzoshaki near the Seto Marine Biological Laboratory on March 26, 1979.

This animal is quite identical with *A. maldivense* from Tanegashima Island described above in nearly all morphological characters inclusive of the symmetrical metapleura, but the additional tuft of cirrus-like filaments is missing and the mid-gut coecum is indiscernible in the former specimen. The meristic characters are: a-ca. 320, b-40, c-0.42, d-42, e-14, f-12, g-68, h-31.2, i-27, j-more than 23 (for symbols a-f, see the explanation of Table 1).

Further, two more lancelets were dredged at a depth of 36 m from the sandy bottom near the Cape Shionomisaki, the southern end of Kii Peninsula, by members of the Sabiura Marine Park Research Station on June 25, 1979. These are quite similar to the above-mentioned specimen of *A. maldivense* obtained near the Seto Marine Biological Laboratory, except for the mid-gut coecum that is well defined in these specimens though very short, extending only to the span of 6 to 8 myotomes. The gonads in the larger specimen seem to contain sperms, while those in the smaller are rudimentary. The meristic characters are a-ca. 300, b-42, c-0.47, d-42, e-15, f-12, g-69, h-20.1, i-28, j-24 in the larger, and a-ca. 300, b-40, c-0.44, d-42, e-14, f-11, g-67, h-14.7, i-18 in the smaller.

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